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TAXONOMY OF THE *OCHYROTICA CONNEXIVA* GROUP (LEPIDOPTERA, PTEROPHORIDAE, AGDISTINAE)

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ABSTRACT

The genus *Steganodactyla* Walsingham is synonymized with *Ochyrotica* Walsingham. The genus is diagnosed and the *O. connexiva* species group is established, reviewed and keyed.

The holotype of *Ochyrotica connexiva* (Walsingham, 1891) comb. nov., from Burma, has been reexamined and its identity established. Illustrations of the adult and of the female genitalia are given. Material from Australia, Sumatra, Java, Borneo, Celebes and the Moluccas appears to represent a series of new species closely related to *O. connexiva*, which are described and illustrated here: *Ochyrotica kurandica* Arenberger nov. spec, *O. celebica* Arenberger nov. spec., *O. javanica* Gielis nov. spec., *O. borneoica* Gielis nov. spec. and *O. misoolica* Gielis nov. spec. Single specimens from Sumatra and Celebes, probably representing undescribed species are discussed, but not named.

INTRODUCTION

The subfamily Agdistinae, one of the three subfamilies of Pterophoridae, can be recognized by their uncleft wings, in contrast to the cleft wings in the subfamilies Platyptiliinae and Pterophorinae. Currently the genera *Agdistis* Hübner, 1825, *Ochyrotica* Walsingham, 1891, and *Steganodactyla* Walsingham, 1891, are recognized within this subfamily. Although no extensive revision of the genus *Agdistis* has been published, the authors have dealt with a great number of species in some publications, mostly arranged by zoogeographical area (i.e.: Arenberger 1977, 1985, 1986; Gielis, 1986).

Very little material is available of the genera *Ochyrotica* and *Steganodactyla*, to be synonymized below, where most species are only known through the original descriptions. The discovery of a number of new species belonging to this genus, prompted us to start a review of *Ochyrotica*. Here we will deal with the *O. connexiva* group only.

Abbreviations used: BMNH: British Museum (Natural History), London, UK.; RMNH: Rijksmuseum van Natuurlijke Historie, Leiden, Netherlands.

Genus **Ochyrotica** Walsingham, 1891
(fig. 30)

Ochyrotica Walsingham, 1891 (August): 217-218. Type-species: *Ochyrotica fasciata* Walsingham, 1891: 218, by monotypy and original designation.

Steganodactyla Walsingham, 1891 (September): 241. Type-species: *Steganodactyla concursa* Walsingham, 1891: 241-242, by original designation. **Syn. nov.**

Diagnosis. — The genus *Ochyrotica* is distinguished from *Agdistis* by the peculiar scales on top of the head, the shape of the palpi and the presence of prominent spurs on the hindlegs.

Description. — Head dorsally with prominent bifid scales. Antennae approximately half forewing-length. Labial palpi as long as head, third segment small. Hindlegs with prominent pairs of spurs of equal length.

Distribution and composition. — The genus *Ochyrotica* has a tropical distribution. Two species have been described from the Neotropical region:

O. fasciata Walsingham, 1891 and *O. placozona* Meyrick, 1921; two were described from Africa and Madagascar: *Steganodactyla africana* Bigot, 1969, and *O. rufa* Arenberger, 1987; and four species were previously known from the Oriental and Australian regions: *O. buergersi* Gaede, 1916; *S. cretosa* Durrant, 1916; *S. concursa* Walsingham, 1891 and *S. connexiva* Walsingham, 1891.

Remarks. — As stated in Walsingham's original descriptions of *Ochyrotica* and *Steganodactyla*, there is some difference in the margins of the hind-wings. However, the wing-venation and the shape of the characteristic scales on the head are identical, as is the overall morphology. We therefore have synonymized both genera here.

It should be pointed out that most named species have not yet been defined properly and are in need of further examination.

O. connexiva comb. nov. and five previously undescribed species appear to form a tight assemblage and are here treated as the *O. connexiva* group. Other oriental species are forming similar complexes and will be dealt with in future publications. Material of *Ochyrotica* is extremely scarce in collections, we only know 22 specimens of the present group.

Ochyrotica connexiva group

Diagnosis. — The *O. connexiva* group is distinguished by the golden brown costal and dorsal band and the central white band on the forewings.

KEY TO THE SPECIES OF THE *O. CONNEXIVA* GROUP

1. Dorsal band in forewing with costal protrusion at 1/3 2
— Dorsal band almost straight to end of cell 4
2. Dorsal band interrupted distally of protrusion (fig. 13) . . . . *O. kurandica* Arenberger
— Dorsal band continuous, sometimes very narrow, distally of protrusion 3
3. Scaling in distal field poor, costal band narrow (fig. 7) . . . . *O. connexiva* Walsingham
— Scaling in distal field with abundant large scales, costal band wide with dark brown part above end of cell (fig. 19) . . . . *O. borneoica* Gielis
4. Apex of forewing slightly extended (fig. 9) . . . . *O. celebica* Arenberger
— Apex acutely extended 5
5. Costal band interrupted in distal wing part (fig. 23) . . . . *O. misoolica* Gielis
— Costal band not interrupted in distal wing part (fig. 17) . . . . *O. javanica* Gielis

KEY BASED ON FEMALE GENITALIA

1. Signum absent 2
— Signum present 3
2. Anal margin of seventh sternite deeply excavate, bifurcate (fig. 8) . . . . *O. connexiva* Walsingham
— Anal margin of seventh sternite slightly excavate, curved (fig. 16) . . . . *O. kurandica* Arenberger
3. Anal margin of sixth sternite with densely haired, semicircular excavation (fig. 26) . . . . *O. misoolica* Gielis
— Anal margin of sixth sternite not hairy 4
4. Anal margin of seventh sternite with four thorns of approximately the same size (fig. 22) . . . . *O. borneoica* Gielis
— Anal margin of seventh sternite with thorns and spines of variable length 5
5. Medial part of anal margin of seventh sternite curved (fig. 12) . . . . . . *O. celebica* Arenberger
— Medial part of anal margin with group of thorns and spines (fig. 18) . . . . *O. javanica* Gielis

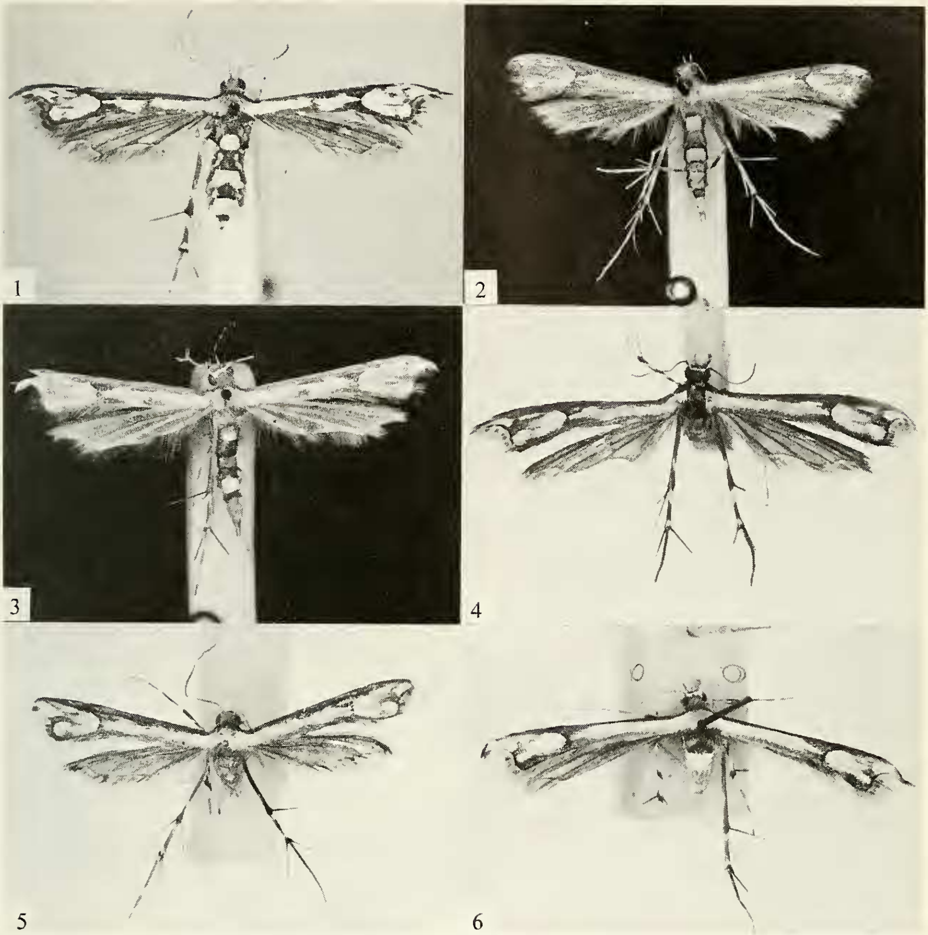
KEY BASED ON MALE GENITALIA

Note: male genitalia of *O. connexiva* and *O. javanica* are unknown.

1. Saccular process curved at extreme tip (fig. 10) . . . .*O. celebica* Arenberger
— Saccular process curved in middle 2
2. Basal part of saccular process swollen (fig. 24) . . . . *O. misoolica* Gielis
— Basal part of saccular process approximately as wide as central 3
3. Basal part of saccular process with small thorn (fig. 20); aedeagus strongly curved (fig. 21) . . . . *O. borneoica* Gielis
— Basal part of saccular process straight (fig. 14), aedeagus almost straight (fig. 15) . . . . *O. kurandica* Arenberger

Ochyrotica connexiva (Walsingham, 1891) comb. nov.
(figs. 1, 7, 8, 30)

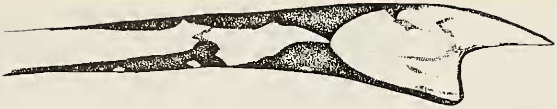
Steganodactyla connexiva Walsingham, 1891: 242. Holotype ♀: [Burma], Thandsung, Karen Hills, Pegu, 4.000 ft., 1890, W. Doherty, Coll. Walsingham No. 41747, Genitalia slide 17992 (BMNH) [examined].



Figs. 1-6. *Ochyrotica* species, holotypes. 1, *O. connexiva*, ♀; 2, *O. celebica*, ♂; 3, *O. kurandica*, ♂; 4, *O. javanica*, ♀; 5, *O. borneoica*, ♂; 6, *O. misoolica*, ♂.

Redescription.

Female (figs. 1, 7). — Wingspan 17 mm. Forewings snow-white, all parts of pattern golden brown. The pattern consists of a continuous band along costal and dorsal margin, widening at the end of the cell and fusing, forming a semicircular interruption between the cell and the distal field. The dorsal band widens suddenly at 1/3 of dorsal margin, but does not reach the costal band. The distal field filled with prominent iridescent scales in lines and groups along the veins. The scales along the radial veins in a transverse direction are notable. The apex is prolonged and acute, the tornus rounded. Terminal fringe brown, with dark basal fringe-line (fig. 7). Hindwings brown. Thorax snow-white, on the cranial and abdominal sides with a golden-brown margin as an extension of the costal and dorsal wing markings. Tegulae white, posterior parts brown. Head dorsally, antennae and upperside of palpae grey-white, frons brown. Antennae approximately 1/3 forewing-length. Third segment of palpi curved forward,



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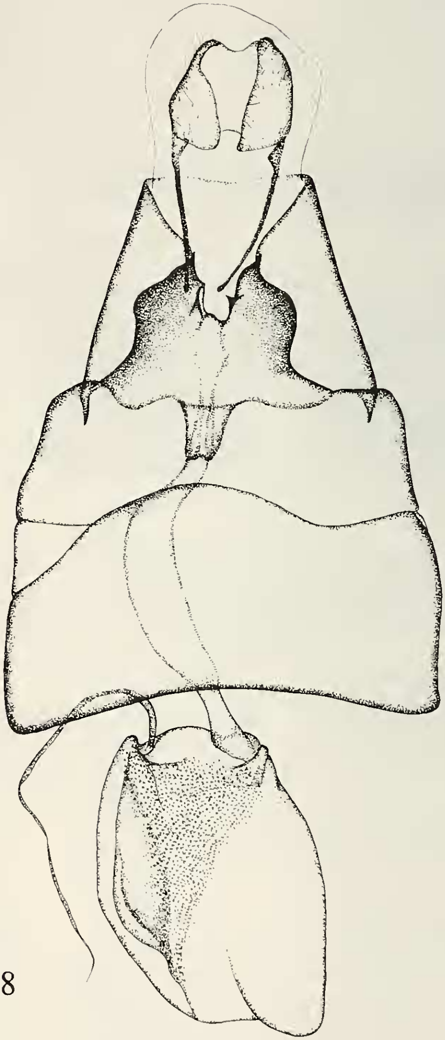

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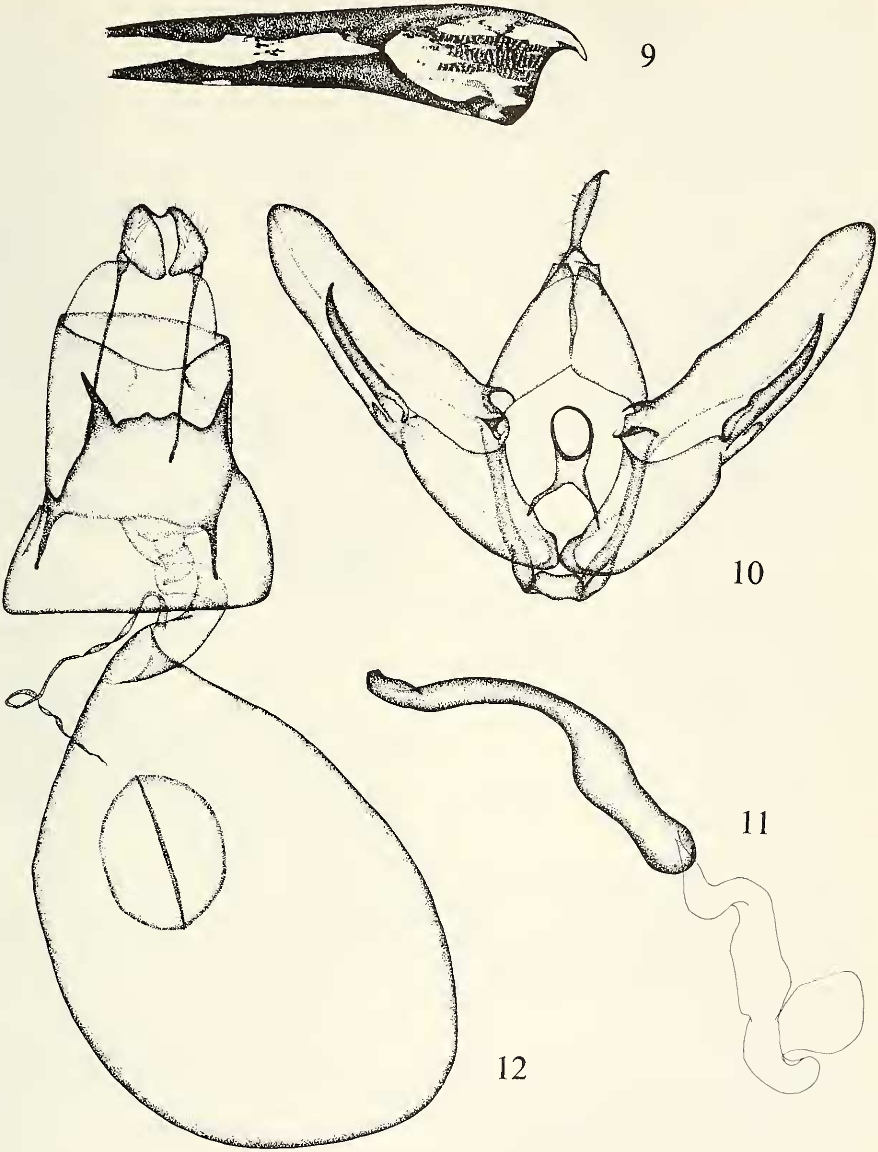
Figs. 7, 8. *Ochyrotica connexiva*; 7, forewing pattern; 8, female genitalia, holotype, slide BMNH 17992.



Figs. 9-12. *Ochyrotica celebica*; 9, forewing pattern; 10, male genitalia, slide EA 3358; 11, aedeagus, slide EA 3358; 12, female genitalia, slide EA 3364.

approximately 1/2 as long as second. Abdominal segments alternating white and brown, all segments laterally brown. The scales of the second and third brown segments laterally interrupted by a white line.

Male genitalia. — Unknown.

Female genitalia (fig. 8). — Seventh sternite intensively sclerotized, and extending far over the ostium bursae. The anal margin ending in two pointed thorns. Between these, at the base of the resulting excavation, two strongly sclerotized small teeth. Antrum funnel-shaped, very weakly sclerotized. Ductus bursae tubelike, the middle section wider than the proximal antrum margin. Bursa copulatrix vesicular, with laterally a pronounced pocketlike fold. Bursa, especially the anal part, covered with sclerotized spiculae. Ductus seminalis originating in the anal part of the corpus bursae. Apophyses anteriores minute, short pointed. Apophyses posteriores approximately three times as long as papillae anales.

Flight period. — Unknown.

Distribution (fig. 30). — Burma: Pegu.

Remarks. — The holotype was placed amongst a series of specimens with approximately the same external features, originating from Celebes and Australia. After examination of the genitalia of the specimens available, the holotype turned out to be the only specimen of *connexiva*, the others belonging to *O. celebica* and *O. kurandica*.

Ochyrotica celebica Arenberger spec. nov.
(figs. 2, 9-12, 30)

Type material: Holotype ♂: S. Celebes, Macassar [Ujung Pandang], 500 ft., 1891, W. Doherty, Coll. Walsingham No. 40605, Genitalia slide Arenberger 3368 (BMNH). Paratypes: 2 ♂, 1 ♀, S. Celebes (low country), 1896, W. Doherty, Coll. Walsingham no. 42102, 42105 and 42104, Genitalia slides Arenberger 3358 and 3364 (BMNH).

Description.

Male, female (figs. 2, 9). — Wingspan 15 mm. Very similar to *O. connexiva*. The costal and distal bands are wider, leaving only approximately 1/3 of the total width of the forewing for the white middle section. The acute widening of the band at 1/3 of the dorsum is missing. The white distal field is interrupted by some longitudinal brown lines. The abdominal segments are also alternately brown and white, but these colours are not so bright and contrasted, but more faint.

Male genitalia (figs. 10, 11). — The genitalia are symmetrical. Valvae distally gradually narrowing. Saccular process at the tip smoothly curved towards costa. Uncus distally pointed. Uncus slightly shorter than saccular process. Tegumen distally converging, assuming a triangular form. Basal part of aedeagus twice as wide as distal, strongly bent at mid-length.

Female genitalia (fig. 12). — Seventh sternite with a characteristic form. The anal margin shows a pronounced thorn on both sides; intervening space a little sinuous in middle. Antrum weakly sclerotized, positioned on the right side. Ductus bursae significantly shorter than the corpus bursae. Corpus bursae extraordinarily large, vesicular. Its length equals the length of the remaining genitalia. The large elliptical signum resembles a strongly sclerotized honeycomb, which is divided into two along the longitudinal axis by a heavily sclerotized line. The ductus seminalis originates in the anal part of the bursa copulatrix. Apophyses anteriores longer than in *O. connexiva* and approximately as long as the antrum. Apophyses posteriores twice as long as the papillae anales.

Flight period. — Unknown.

Distribution (fig. 30). — Indonesia: Celebes.

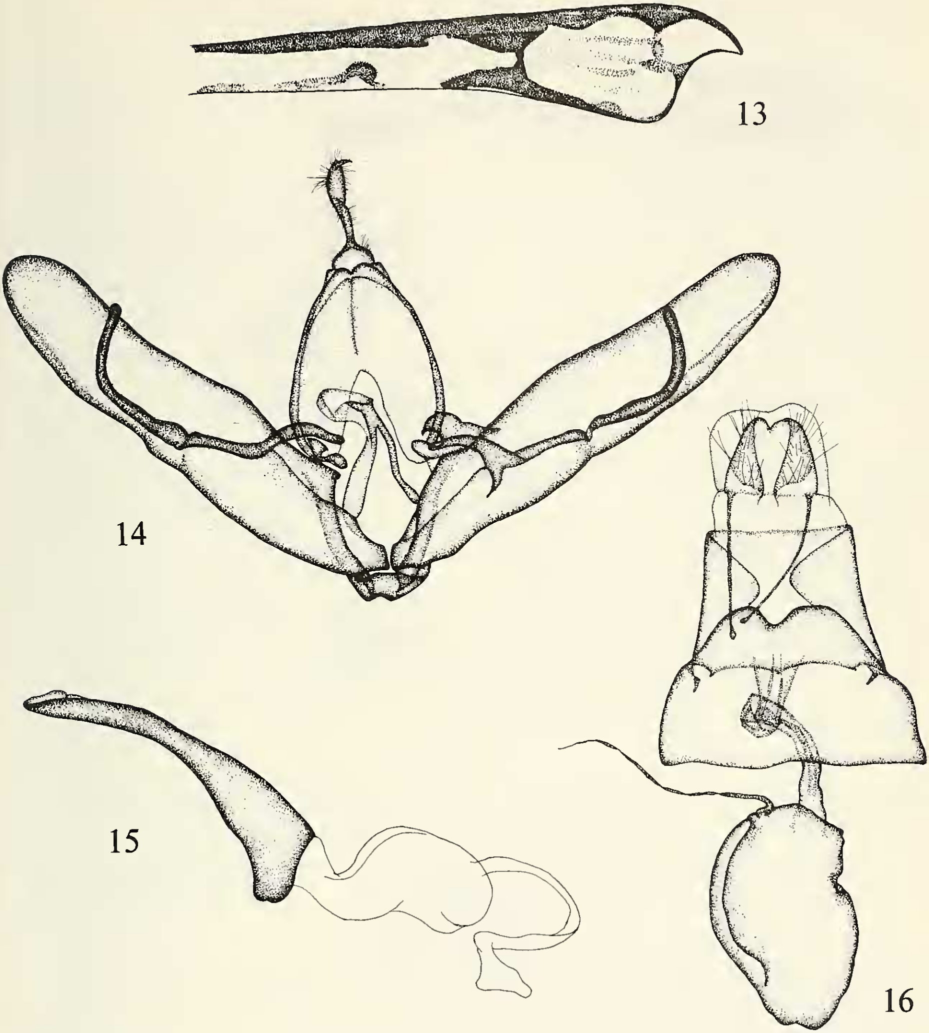
Ochyrotica kurandica Arenberger spec. nov.
(figs. 3, 13-16, 30)

Type material: Holotype ♂: [Australia]: N. Queensland, Kuranda, 21.vi.1905, Dodd, Genitalia slide Arenberger 3349 ♂ (BMNH). Paratypes: 2 ♂, 1 ♀, same locality, 4.iv.1905, 22.vii.1904 and 21.iv.1905, Dodd, Genitalia slide Arenberger 3371 (BMNH).

Description.

Male, female (figs 3, 13). — Wingspan 16 mm. Forewings in colour and pattern as in *O. connexiva* and *O. celebica*. However, the costal band is as wide as in *O. celebica*, whereas the dorsal band has the shape as in *O. connexiva*: with a clear acute spot at 1/3 of the dorsal length. Differs from *O. connexiva* by the interruption of the dorsal band distally of the spot. The brown longitudinal lines in the distal wing part are far less distinct than in *O. celebica*. The colouring of the abdominal segments is as contrasted as in *O. connexiva* (figs. 3, 13).

Male genitalia (figs. 14, 15). — Shape of the valvae as in *O. celebica*. The saccular process, however, is strongly curved at mid-length, not at its tip. Further a spine, with the tip near the juxta, originates from the middle of the costal margin



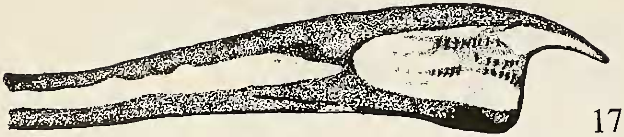
Figs. 13-16. *Ochyrotica kurandica*; 13, forewing pattern; 14, male genitalia, holotype, slide EA 3349; 15, aedeagus, holotype, slide EA 3349; 16, female genitalia, slide EA 3371.

of the sacculus. Aedeagus basally widest, gradually narrowing towards its tip. It is not as strongly bent as in *O. celebica*.

Female genitalia (fig. 16). — The anal margin of the seventh sternite slightly excavate, curved. Antrum, bursa copulatrix, the origin of the ductus seminalis and the apophyses all shaped as in *O. connexiva*.

Flight period. — April, June, July.

Distribution (fig. 30). — Australia: N. Queensland, Kuranda.



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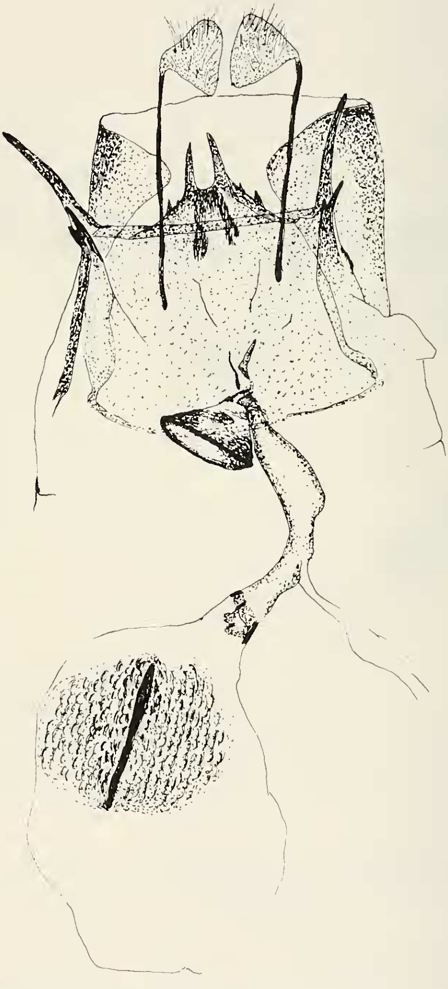

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Figs. 17-18. *Ochyrotica javanica*; 17, forewing pattern; 18, female genitalia, holotype, slide CG 3032.

Ochyrotica javanica Gielis spec. nov.
(figs. 4, 17-18, 30)

Type material: Holotype ♀: W. Java, Buitenz(org) [Bogor], 1896, 7412, Genitalia slide Gielis 3032 (RMNH).

Description.

Female (figs. 4, 17). — Wingspan 18 mm. Forewings dirty white, but pattern and colour of markings close to *O. celebica*. However, the costal margin of the dorsal band and the dorsal margin of the costal band are smoother, almost straight. The brown longitudinal lines in the distal wing part are distinct and arranged as a dentated spot.

Male genitalia. — Unknown.

Female genitalia (fig. 18). — Anal margin of the seventh sternite on both sides, laterally, with a large thorn and an asymmetrical bifurcated small one. The central part of the anal margin gradually extending distally. The tip has a bifurcate shape, the thorns being half the length of the lateral ones. Some additional smaller spines bordering the large thorns. Antrum weakly sclerotized, conically shaped and bent anteriorly. Ductus bursae slightly shorter than corpus bursae. Bursa posteriorly with a small folded sclerotized ring. Signum honeycomb-like with a central sclerotized dividing line. The ductus seminalis originates at 1/3 of the length of the ductus. Apophyses posteriores twice as long as the papillae anales. Apophyses anteriores obsolete.

Flight period. — Unknown.

Distribution (fig. 30). — Indonesia: Java.

Remarks. — This species differs from *O. kurandica* by the wing pattern and the characteristic seventh sternite in the female.

Ochyrotica borneoica Gielis spec. nov.
(figs. 5, 19-22, 30)

Type material: Holotype ♂: E. Borneo, Balikpapan, Mentawir River, 50 m, x.1950, A.M.R. Wegner, Genitalia slide Gielis 3035 (RMNH). Paratypes: 1 ♀, locality and date as holotype, Genitalia slide Gielis 3036, (CG); 1 ♀, E. Borneo, Tabang, Bengen River, 125 m. 24.ix.1956, A.M.R. Wegner, Genitalia slide Gielis 3031 (RMNH); 1 ♀, N. Borneo, Sabah, Tawau Zone, 60 km W. of Lahad Datu, 04.58N 117.48E, Danum Valley Field Centre, edge lowland-rain forest, 150 m, 18-28.x.1987, at light, J. Huisman & R. de Jong (RMNH); 1 ♀, N. Borneo, Sabah, 12 km NNE Ranau, 6.03N 116.42E, Staff-quarters, poring hot springs, 550 m., 16.xii.1987, J. Huisman (RMNH).

Description

Male, female (figs. 5, 19). — Wingspan 14-15 mm. Forewing in shape, pattern and colour very similar to *O. kurandica*. However, it differs in the shape of the dorsal band, which shows a gradual widening at 1/3 of the wing length. Moreover the band is not interrupted beyond this widening. The brown longitudinal lines in the distal wing part are as in *O. javanica*.

Male genitalia (fig. 22). — The symmetrical genitalia are similar to *O. celebica*. They differ by the longer saccular process, which is curved at 2/3 of its length; at the base of the process a small dorsal thorn. The tegumen is more slender. The strongly curved aedeagus with distally localized cornuti consisting of minute spiculae.

Female genitalia (fig. 22). — The anal margin of the seventh sternite has four thorns with broad bases, of equal length. The central two with serrated margins. Antrum triangular with rounded corners, bent anteriorly. Ductus bursae gradually widening towards bursa copulatrix. Posteriorly of the bursa, the ductus with a narrow sclerotized ring. The ductus seminalis originates at midlength of the ductus. Signum as in *O. celebica*.

Flight period. — September, October and December.

Distribution (fig. 30). — North and East Borneo.

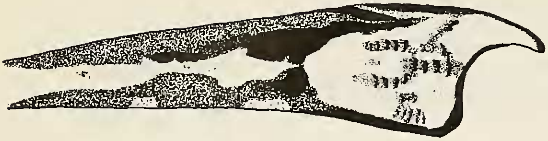
Remarks. — This species differs from the preceding one in the shape of the forewing pattern and the male and female genitalia.

Ochyrotica misoolica Gielis spec. nov.
(figs. 6, 23-26, 30)

Type material: Holotype ♂, Misool Island (W), Fakal, 0-75 m., 8.ix-20.x.1948, M.A. Lieftinck, Genitalia slide Gielis 3006 (RMNH). Paratypes: 1 ♂, 1 ♀, same locality and date as holotype, Genitalia slide Gielis 3002 ♀ (RMNH, CG); 1 ♀, N. Moluccas, E. Batjan [Bacan], 0 m. vi-vii.1953, A.M.R. Wegner, Genitalia slide Gielis 3030 (RMNH).

Description.

Male, female (figs. 6, 23). — Wingspan 14-16 mm. Forewings in shape, colour and pattern similar to *O. celebica*. In the white distal field, the brown lines and scales less pronounced. These scales are connected with the costal margin, in this way isolating the white part in the acute tip



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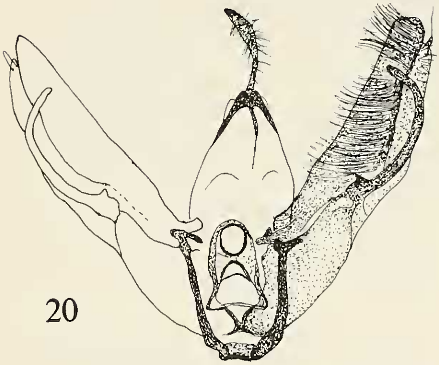

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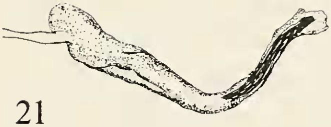

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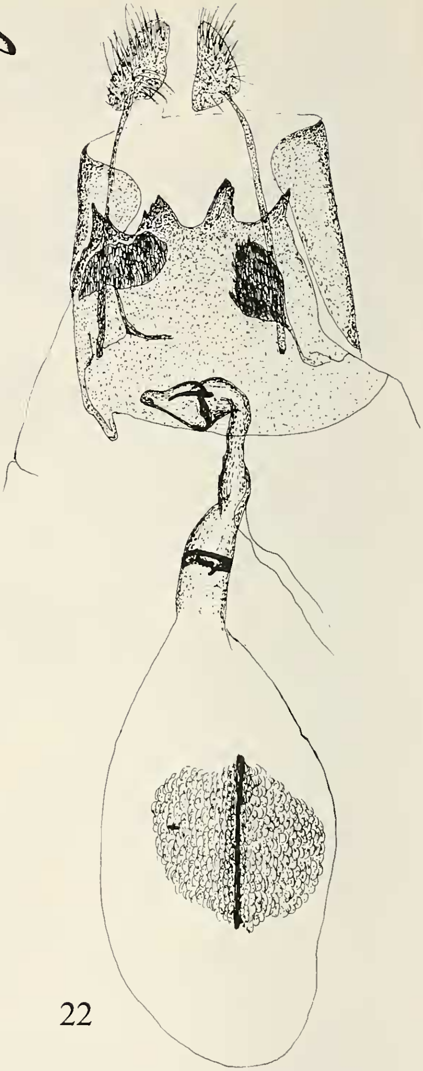

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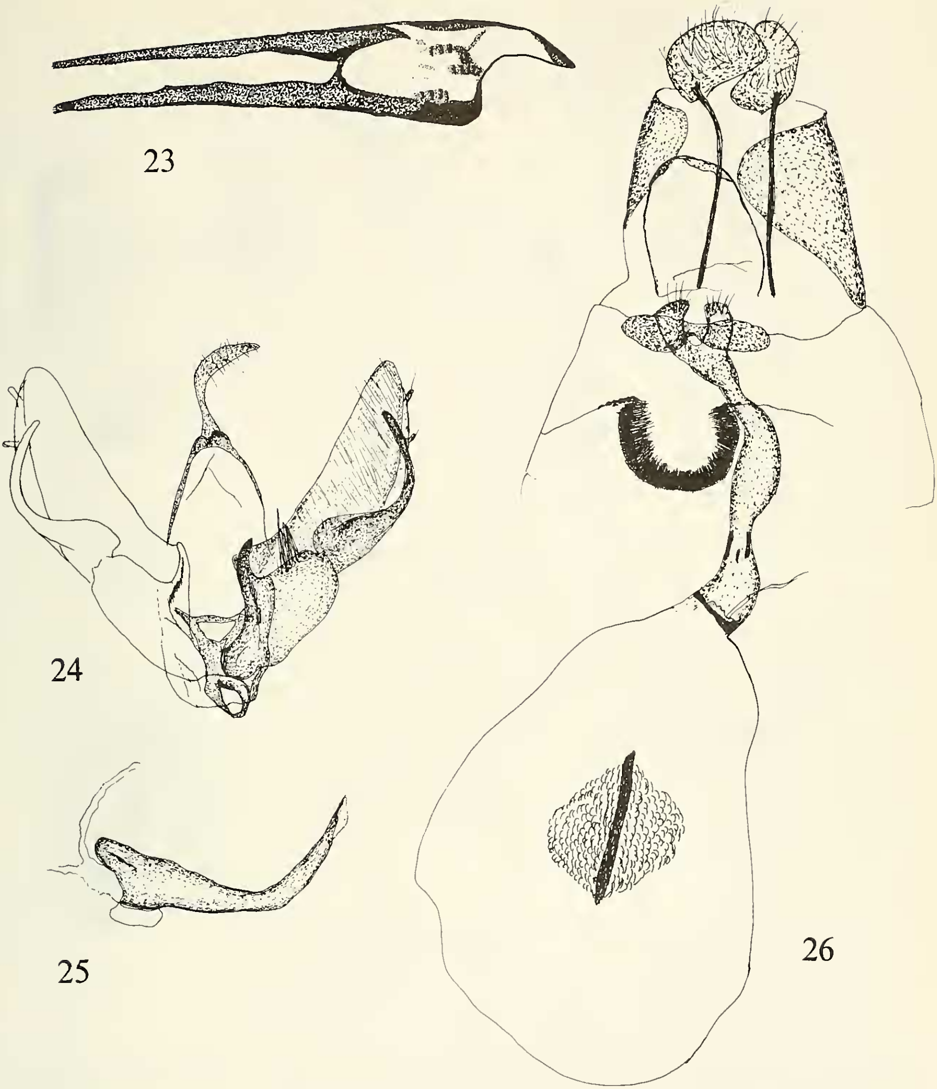
Figs. 19-22. *Ochyrotica borneoica*; 19, forewing pattern; 20, male genitalia, holotype, slide CG 3035; 21, aedeagus, holotype, slide CG 3035; 22, female genitalia, slide CG 3036.

of the wing. Abdominal segments as in *O. connexiva.*

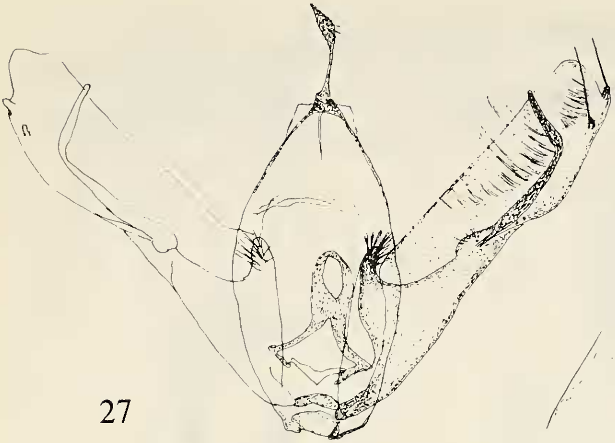
Male genitalia (figs 24, 25). — In shape close to *O. borneoica*, but the basal half of the saccular process swollen, gradually narrowing. Pulvinus in the shape of a curved thorn. Anellus costally flattened, triangular. Basal part of aedeagus twice as wide as distal, strongly bent in middle.

Female genitalia (fig. 26). — The anal margin of the sixth sternite with a semicircular excavation,



Figs. 23-26. *Ochyrotica misoolica*; 23, forewing pattern; 24, male genitalia, holotype, slide CG 3006; 25, aedeagus, holotype, slide CG 3006; 26, female genitalia, slide CG 3030.

with densely haired fringe. The anal margin of the seventh sternite forms a centrally fused, double ellipsoid disc. This covers the weakly sclerotized bifurcate antrum. Ductus bursae weakly sclerotized, anteriorly at 1/4 of its length with three small heavily sclerotized rods, of which two are approximately twice as long as the third; a small sclerotized ring at the entrance of the bursa copulatrix; the ductus seminalis also originates at this point. The bursa copulatrix has a vesicular



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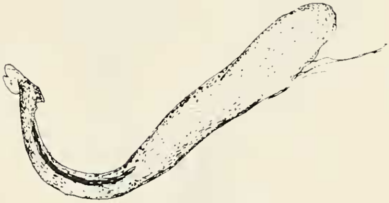

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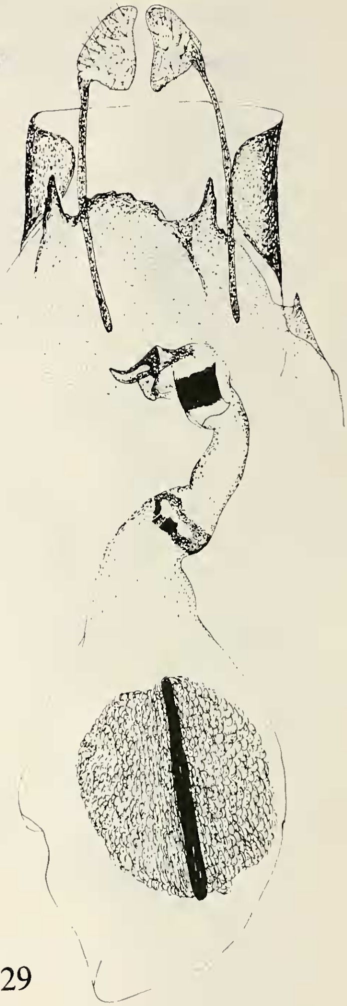

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Figs. 27, 28. *Ochyrotica* species 1, slide CG 3033; 27, male genitalia; 28, aedeagus. Fig. 29. *Ochyrotica* species 2, female genitalia, slide CG 3034.

shape. Signum as in *O. celebica*. Apophyses anteriores obsolete. Apophyses posteriores twice as long as the papillae anales.

Flight period. — June-July, September-October.

Distribution (fig. 30). — Indonesia, Moluccas: Misool, Batjan.

Remarks. — Although the external characters, and the male genitalia resemble those of *O. celebica*, the female genitalia show structures which are not seen in any other species of this complex.

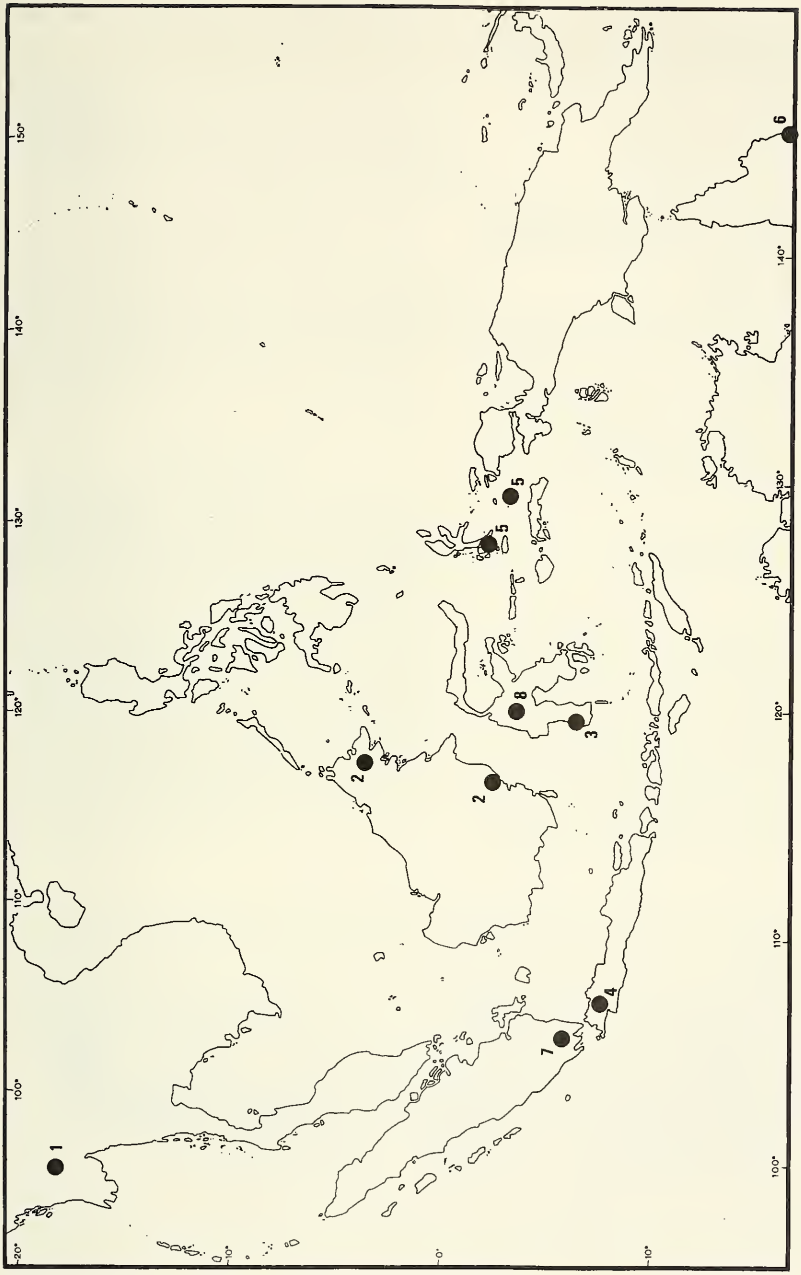

Fig. 30. Distribution of the species in the *Ochyrotica connexiva* group; 1, *O. connexiva*; 2, *O. borneoica*; 3, *O. celebica*; 4, *O. javanica*; 5, *O. misoolica*; 6, *O. kurandica*; 7, *O.* species 1 from Sumatra; 8, *O.* species 2 from Celebes.

SPECIES INCERTAE SEDIS

The following two specimens have been treated and illustrated to facilitate further study of this group of insects, but they are not named due to lack and condition of material.

Ochyrotica species 1
(figs. 27, 28, 30)

Material examined: 1 ♂: S. Sumatra, Lampongs, Wai Lima, xi-xii.1921, No. 14, Karny, Genitalia slide Gielis 3033 (RMNH).

Remarks. — This specimen is not named here because the specimen, a badly worn male, cannot be linked to a female from the island of Sumatra (fig. 30); therefore the most diagnostic group of characters is not available. It might, however, be the unknown male of *O. javanica*. Additional material is necessary to establish the identity of the Sumatran species.

Ochyrotica species 2
(figs. 29, 30)

Material examined: 1 ♀: Celebes, 14.iv.1950, A.J. Kostermans, Genitalia slide Gielis 3034 (RMNH).

Remarks. — This specimen resembles *O. celebica* externally closely. Also the anal margin of the seventh sternite has a similar shape. However, in the region of the junction between the ductus bursae and the bursa copulatrix a small sclerotized band is present, as in *O. javanica*. Moreover, there is a heavy sclerotized plate, in the posterior quarter of the ductus, which is missing in *O. celebica*. In this specimen the signum is extremely big, almost half the size of the bursa copulatrix.

In view of the fact that the female genitalia show many diagnostic features in the species described above, we assume that this specimen belongs to another undescribed species. We, however, refrain from naming it here, until more and better material comes available.

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